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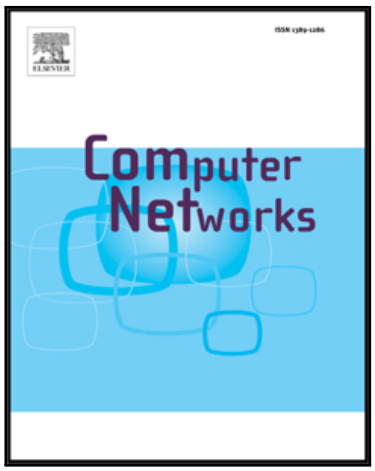

Secure Virtual Network Embedding with Flexible Bandwidth-Based Revenue Maximization

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Secure Virtual Network Embedding with Flexible Bandwidth-Based Revenue Maximization

Cihangir Beşiktaş, Didem Gözüpek, Aydın Ulaş and Erhan Lokman

Abstract

Network virtualization is an effective way to overcome the ossification of Internet by enabling multiple virtual networks to coexist on a shared infrastructure. Virtual network embedding is a resource allocation problem concerned with the assignment of physical resources to the virtual networks. Several security issues about virtual network embedding are hitherto unexplored. For instance, some virtual network operators may distrust each other and require that their virtual infrastructure is not cohosted on the same physical equipment. In this paper, we address this problem by proposing a virtual network embedding problem that ensures that the virtual networks of conflicting operators are mapped to different physical equipments. Furthermore, our problem formulation enables the virtual links to select among a range of discrete bandwidth values, each with a corresponding price and thereby realizing any possible revenue function. We evaluate the performance of our heuristic algorithm by comparison with the results obtained from our integer linear programming formulation using optimization software CPLEX.[1]

Key words: Virtualization, virtual network embedding, virtual network assignment, resource allocation, optimization, integer linear programming, heuristic algorithm.

I. Introduction

The explosive growth of Internet encourages the development of new technologies and applications; however, its large scale hinders their deployment. Since there are numerous service providers, applying a new architecture or technology requires mutual agreements among Internet Service Providers (ISPs) and necessitates changes in the routers and main computers. Therefore, Internet is increasingly becoming ossified. To deal with this problem, the concept of "network virtualization" has

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